

# PATENT SPECIFICATION

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(72) Inventors DENIS ALFRED NEWELL and KENNETH ATKINS



## (54) THROWAWAY TIP TOOLHOLDERS

(71) We, ALFRED HERBERT LIMITED, a British Company, of Edgwick Works, Coventry CV4 5GT. do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to throwaway tip toolholders and is particularly applicable to threading tools of the single point kind.

Conveniently throwaway tip toolholders have a tip seat and a clamp for clamping the tip to its seat. It is not usual for there to be any provision to guard against the cutting force experienced by the tip pulling the tip off its seat since the tip is normally thrust against its seat by the threading action. In single point thread cutting, however, it is often necessary so to arrange the orientation of the tool and the direction of feed that there is a tendency for the top to be pulled away from its seat. One proposed solution to this problem involves the use of a clamp having an overhanging portion which fits in a bevelled recess in the tip. This proposal is, however, considered to be unsatisfactory since the overhanging portion must of necessity be of small dimensions and therefore tends to be weak.

According to the present invention, a toolholder for a single point thread-cutting tool comprises a body having a tip recess defined by a side face, a base face and an end face, at least one of said base face and said end face being inclined at an acute angle to the side face, and a clamp for retaining within the recess a tool tip having faces corresponding to the recess faces, said clamp having a portion adapted to engage a further face of such a tool tip when the latter is disposed in the recess with its said corresponding faces engaged with said recess faces respectively, the clamp being arranged so that when in clamping position, a surface thereof which is outermost in a direction away from said base face if flush with an adjacent surface of the body.

In a convenient arrangement, the base

face of the tip seat is inclined to said top face of toolholder body, the clamp having a rib on an end portion thereof for engagement with the tool tip.

The invention will now be described, by way of example, with reference to the accompanying drawings in which:—

Figures 1 and 2 are mutually perpendicular elevations of a tip for use in an example of a tool in accordance with the invention;

Figures 3 and 4 are mutually perpendicular views of the toolholder and tip, with the clamp of the toolholder and part of the tip removed for clarity;

Figures 5 and 6 are mutually perpendicular elevations showing another example of the invention, and

Figures 7 and 8 are mutually perpendicular views of an internal thread-cutting toolholder embodying the invention.

Referring firstly to Figures 1 and 2 the tip 1 has a flat base 10, and a pair of spaced parallel side faces 11 and 12 perpendicular to the base face. The tip also has a pair of end faces 13 and 14 inclined at an acute angle of for example 45° to the side faces and perpendicular to the base face. Each end of the tip has a working point formed by grinding with a form grinder fed along a path inclined to the base face. The top face 15 of the tip is relieved at its ends to form an appropriate cut angle at each working point. Intermediate its ends the top face has a transverse groove 16.

The toolholder 17 (Figs 3 and 4) has a square section shank 18 at one end of which there is formed a tip seat recess defined by a side face 19 which is perpendicular to the top face 18a of the shank, a base face 20 which is perpendicular to the side face 19 longitudinal to the top face 18a, and an end face 21 perpendicular to the base face 20 but inclined to the side face 19 at an angle of 45°.

Thus the tip can seat in the tip seat recess with the base face 10 of the tip against base face 20 of the tip seat recess, one of the side faces 11 or 12 of the tip against the side face

19 of the tip seat recess and one of the end faces 13 or 14 against the end face 21 of the tip seat recess.

The groove 16 across the top face of the tip receives a rib 22a on the end of a clamp 22 mounted on the shank 18. This clamp is situated in a recess 23 in the shank 18 which communicates at one end with the tip seat recess. The clamp 22 is flush with the top face 18a of the shank and has a portion 22a at one end which engages one sloping side of the recess 16 in the tip and a portion 22b at the other end which engages the recess 23 and permits rocking of the clamp 22. The clamp 22 and the shank 18 have aligned threaded bores 22c and 18b with oppositely handed threads and these are engaged with opposite ends of a screw element 24, of known kind, turning of which thereby effects bodily movement of the clamp axially of the bores 22c and 18b. When the portion 22b is seated in the recess 23 turning of the screw element 24 effects rocking of the clamp 22 to the limited extent permitted by the tolerance of the screw threads and it is this rocking motion which causes the rib 22a to engage in the groove 16. Such engagement causes the tip to be urged along the base face 20 into the 45° angle between the side face 19 and the end face 21, and the tip is thereby securely seated against all three of these faces.

Thus, during thread cutting when it is necessary to feed the tool from left to right as viewed in Figure 3 the tendency for the tip to be displaced away from the side face 19 will be resisted by the inclined end face 21.

The toolholder described above is adapted for use in machines which have the facility for mounting the shank 18 at the required helix angle. The tip seat recess is shown on the left hand side of the top face but could equally be on the right hand side and toolholders of both hands will commonly be required.

Where a toolholder is required for machines in which the shank cannot be inclined to the required helix angle, this helix angle is obtained by cutting the tip seat recess with the faces 19, 20 and 21 appropriately inclined. In this case there would be a requirement for four different toolholder types catering for left or right hand disposition of the tip seat recess and inclination of the tip seat to the left or right.

The invention can also be applied as shown in Figures 5 and 6 to threading tools of the type including a body with a cylindrical mounting spigot 25 and a toolholder 26 carrying a tip 27 as shown in Figures 1 and 2 held in by the clamp 22 as in Figures 3 and 4. In the example shown the end of the body 25 and the toolholder have interengaged straight serrations extending

in a direction perpendicular to the axis of the spigot 25. The toolholder 26 is attached to the body 25 by a screw 28 which is engaged in an elongated hole in the toolholder 26 with the length of the hole parallel to the serrations. For adjusting the toolholder a screw 29 is engaged in a tapped bore therein with its axis parallel to the serrations and with the head of this screw engaged in a notch in the serrated face of the body 25. Turning of this screw 29 whilst the screw 28 is slack moves the toolholder 26 along the serrations. Tightening of the screw 28 then clamps the toolholder in position.

It is to be noted that the majority of throwaway tip single point threading toolholders currently available make use of a chipbreaker to prevent fouling of the clamp by the chips cut from the workpiece. It has been found, however, that good chip-breaking performance cannot be obtained because of the wide variety of cutting conditions which occur during a multi-pass threading operation. For efficient operation the position of the chipbreaker should be adjusted after each pass. The toolholders described above do not employ chipbreakers because the provision of a flush clamp renders a chipbreaker unnecessary.

In a modified form of the invention the base face 20 of the toolholder is inclined at an acute angle to the side face 19 and the underface 10 of the tip is in fact two facets each inclined at the same angle to the associated side face 11, 12 and meeting in a straight edge.

The invention is also applicable to internal thread cutting toolholders and an example of such an arrangement is shown in Figs. 7 and 8. The square section shank of the previous embodiments is replaced by a cylindrical body 30 which would be disposed, in use, with its axis extending longitudinally with reference to Fig. 3. The body is cut to form a flat face 31 corresponding to the top face 18a referred to above and a tip seat recess and clamp receiving recess are formed in this face in a manner corresponding to that of the previous embodiments. Equivalent parts and faces are designated by the same references as in Figs. 1 to 6 and the principle is identical to that described above.

If desired, both the end face 21 and the base face 20 may be inclined at an acute angle to the side face. This may be required when the tip is likely to be subjected to exceptionally high unseating forces during thread cutting. The tips cannot, of course, be machined in a stack, but must be machined individually.

WHAT WE CLAIM IS:—

1. A toolholder for a single point thread-

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- cutting tip, said toolholder comprising a body having a tip recess defined by a side face, a base face and an end face, at least one of said base face and said end face being inclined at an acute angle to the side face, and a clamp for retaining within the recess a tool tip having faces corresponding to the recess faces, said clamp having a portion adapted to engage a further face of such a tool tip when the latter is disposed in the recess with its said corresponding faces engaged with said recess faces respectively, the clamp being arranged so that when in clamping position, a surface thereof which is outermost in a direction away from said base face is flush with an adjacent surface of the body.
2. A toolholder according to Claim 1 wherein the base face of the recess is inclined to said top face of the toolholder body the clamp having a rib on an end portion thereof for engagement with the tool tip.
3. A toolholder according to Claim 1 or Claim 2 wherein the base face is perpendicular to the side face and the end face is perpendicular to the base face but inclined to the side face.
4. A toolholder according to any one of the preceding Claims wherein the end face is inclined to the side face at 45°.
5. A toolholder according to any one of the preceding Claims wherein the clamp is mounted on a shank of the toolholder and is adapted to engage in a groove in a tip disposed in the recess.
6. A toolholder according to Claim 5, wherein the clamp lies in a clamp recess and is arranged to be flush with a top face of the shank in which face the tip recess and clamp recess are formed.
7. A toolholder according to Claim 5 or Claim 6 wherein the clamp incorporates screw means for co-operation with corresponding means on the shank to produce clamping action.
8. A toolholder according to Claim 6 or Claim 7 wherein the clamp has a portion which engages the recess in such a manner as to permit rocking of the clamp.
9. A toolholder according to any one of Claims 6 to 8 wherein said shank is of square section and said top face is on one of the shank sides.
10. A toolholder according to any one of Claims 6 to 8 in the form of an internal thread cutting toolholder wherein said shank is of cylindrical section and cut away to provide a generally diametral face forming said top face.
11. A toolholder substantially as hereinbefore described with reference to Figs 3 and 4, Figs 5 and 6 or Figs 7 and 8 of the accompanying drawings.
12. An assembly including a toolholder according to any one of the preceding claims and a tip mounted and clamped therein.
13. An assembly according to Claim 12 wherein the tip has a groove in one surface only thereof, the groove extending perpendicularly to said side of the tip and having said clamp engaged therein to retain the tip in position in the tip recess.
14. An assembly according to Claim 12 or Claim 13 wherein the tip has a pair of oppositely extending cutting portions each having a single cutting tip, the arrangement being such that the tip may be reversed to bring one or the other cutting portion into cutting position in the holder.
15. An assembly substantially as hereinbefore described with reference to Figs 3 and 4, Figs 5 and 6 or Figs 7 and 8 of the accompanying drawings.
- MARKS & CLERK,  
Alpha Tower,  
A.T.V. Centre,  
Birmingham, B1 1TT,  
Agents for the Applicants.

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COMPLETE SPECIFICATION

3 SHEETS

*This drawing is a reproduction of  
the Original on a reduced scale*

Sheet 1

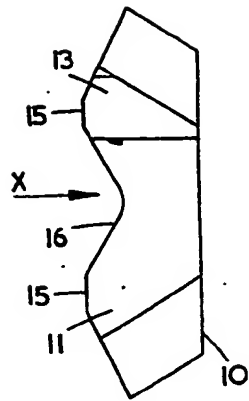


FIG. 1

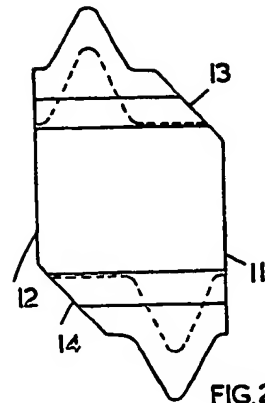


FIG. 2

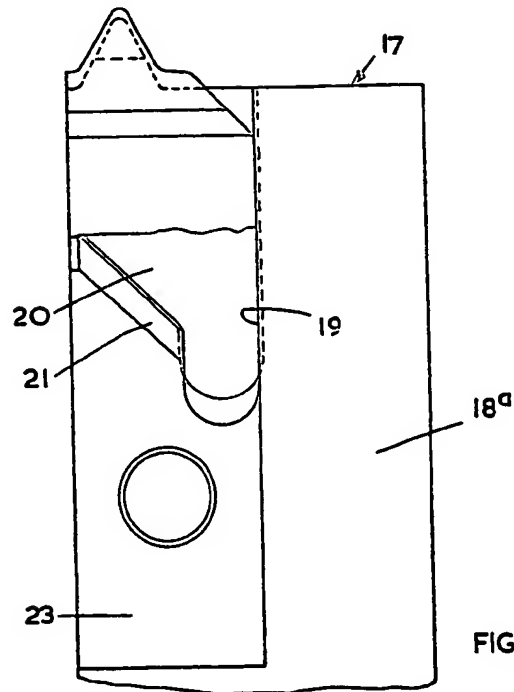


FIG. 3

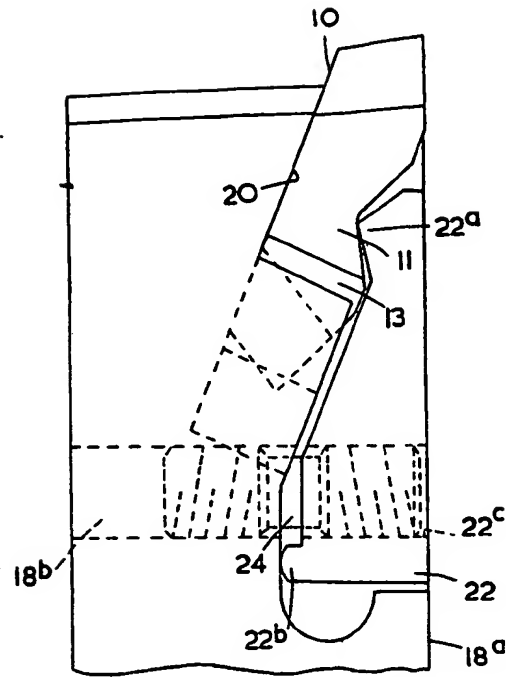


FIG. 4

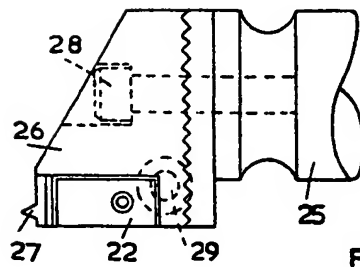


FIG. 5

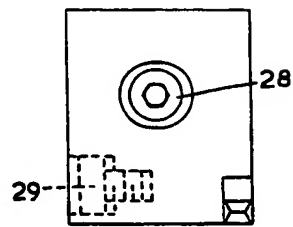


FIG. 6

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COMPLETE SPECIFICATION

3 SHEETS

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the Original on a reduced scale*

Sheet 3

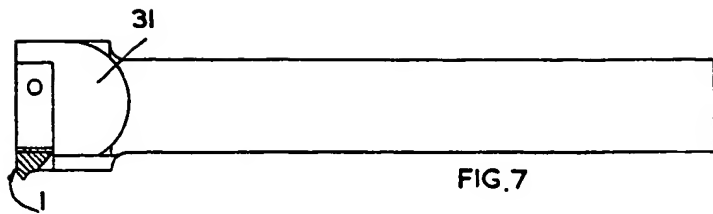


FIG. 7

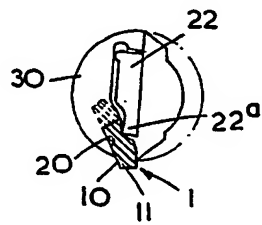


FIG. 8